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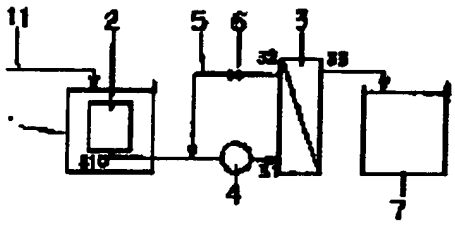
(54) PURIFIED WATER PRODUCING DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To simplify the entire structure of the device and to facilitate the operation by dipping a dead end filter-type microfilter or ultrafilter membrane element in a raw water tank and communicating the filtrate outlet with the raw liq. supply port of a cross-flow reverse-osmosis membrane module.
SOLUTION: An ultrafilter membrane element 2 is dipped in a raw water tank 1, the filtrate outlet 810 is communicated with the raw liq. supply port 31 of a reverse-osmosis membrane module 3 through a pump 4, and the liq. concentrate outlet 32 is communicated with the inlet side of the pump 4. When purified water is needed, the pump 4 is driven, and the pressure in the raw liq. chamber of the module 3 is increased while controlling a pressure regulator 6. Consequently, permeation is conducted by the module 3, filtration is performed by the element 2, the filtration flux of the element 2 and the permeation flux of the module 3 are balanced when a steady state is reached, and the purified water flows into a purified water tank 7 from the permeated liq. outlet 33 of the module 3.



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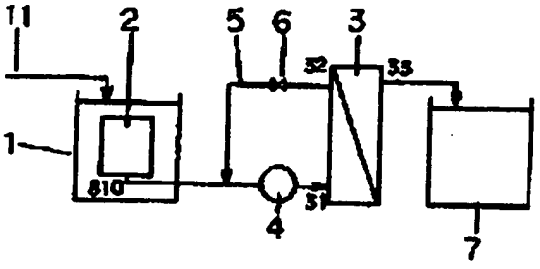
(54)【発明の名称】　浄水の製造装置

(57)【要約】
【課題】河川水等の被処理原水を精密濾過膜または限外濾過膜で前処理のうえ、逆浸透膜モジュールにより浄水とする場合、装置の全体構造の簡易化、運転の簡易化及び逆浸透膜モジュールの塩素殺菌やバクテリヤ等による劣化の確実な排除を保証し得る浄水の製造装置を提供する。
【解決手段】原水タンク1内に全量濾過式の精密濾過または限外濾過膜エレメント2を浸漬設置し、該濾過膜エレメント2の濾過液出口810をポンプ4を介してクロスフロー方式の逆浸透膜モジュール3の原液供給口31に連通し、該逆浸透膜モジュール3の濃縮原液出口32を上記ポンプ4の入口側に連通した。



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【特許請求の範囲】

【請求項1】原水タンク内に全量濾過式の精密濾過または限外濾過膜エレメントを浸漬設置し、該濾過膜エレメントの濾過液出口をポンプを介してクロスフロー方式の逆浸透膜モジュールの原液供給口に連通し、該逆浸透膜モジュールの濃縮原液出口を上記ポンプの入口側に連通したことを特徴とする浄水の製造装置。

【請求項2】原水タンク内に全量濾過式の精密濾過または限外濾過膜エレメントを浸漬設置し、逆浸透膜モジュールの濃縮原液出口にポンプを、該ポンプの出口にエゼクタをそれぞれ連通し、エゼクタの吸入口に前記濾過膜エレメントの濾過液出口を連通したことを特徴とする浄水の製造装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、河川水等を原水として浄水を製造する場合に使用する浄水製造装置に関するものである。

【0002】

【従来の技術】河川水、湖水、地下水等を原水として浄水を得る場合、伝統的に凝集沈殿砂濾過法が使用されてきたが、近来、維持管理の簡易化、ランニングコストの軽減、設置スペースの低減等を図るために、膜分離法が重視されている。膜分離法に使用される膜には、精密濾過膜、限外濾過膜及び逆浸透膜等が存在するが、精密濾過膜や限外濾過膜等では除去が困難なトリハロメタン等の有害物質をも完全に除去するために、逆浸透膜モジュールの使用が要求されている。

【0003】この逆浸透膜モジュールの主流は、スパイラル型膜モジュールである。このスパイラル型膜モジュールにおいては、内部に透過液流路保持材（例えば、不織布、プラスチックネット）を納めた膜封筒を集液管の周囲に原液流路保持材（例えば、プラスチックネット）と共にスパイラル状に巻回し、この膜封筒の開口を集液管内に連通した膜エレメントを筒状ケース内に収納し、筒状ケースの一端に原液供給口を、同ケースの他端に濃縮原液出口をそれぞれ設け、上記スパイラル巻回層間に原水を流通させ、集液管から透過液を取り出している。このスパイラル型膜モジュールでは、外径を抑え、かつ膜面積を広くするために、上記スパイラル巻回層間の原液流路の間隙をかなり狭くしており、濁質の原水を直接流すと、原水通路の閉塞が避けられないので、原水を汚水指数　4以下に前処理することが必要であり、その前処理に精密濾過膜モジュールまたは限外濾過膜モジュールを使用することが公知である。

【0004】図5は精密濾過膜モジュールまたは限外濾過膜モジュールで前処理したうえで、逆浸透膜モジュールで本処理する公知の浄水ラインを示し、原水を原水供給配管11'で原水タンク1'に溜め、この原水をポンプ41'で前処理膜モジュール2'に加圧送入してクロスフロー方式で濾過し濃縮液を原水タンク1'に戻すと共に濾過液を一旦一次処理水タンク10'に溜め、更にこの一次処理水をポンプ42'で逆浸透膜モジュール3'に加圧送入してクロスフロー方式で透過処理し濃縮液を一次処理水タンク10'に戻すと共に濾過液を浄水タンク7'に溜め、浄水として使用している。

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【0005】

【発明が解決しようとする課題】しかしながら、上記の浄水製造設備では、前処理工程で精密濾過膜モジュールまたは限外濾過膜モジュール2'により菌体が除去されるにもかかわらず、一次処理水タンク10'での貯水時にバクテリヤが繁殖し易く、非衛生的であり、逆浸透膜モジュール3'の膜の種類によっては膜がバクテリヤで分解される恐れもあり、また、殺菌用の塩素類を注入すれば、膜酸化・劣化の危険性が生じる。更に、タンクを三基も必要とし、設置スペースの広大化が避けられず、ポンプも二基必要とし、ランニングコストのアップや全体を連動させるための制御装置が複雑化も免れ得ない。

【0006】本発明の目的は、河川水等の濁質原水を精密濾過膜または限外濾過膜で前処理のうえ、逆浸透膜モジュールにより浄水とする場合、装置の全体構造の簡易化、運転の簡易化及び逆浸透膜モジュールの塩素類やバクテリヤ等による劣化の確実な排除を保証し得る浄水の製造装置を提供することにある。

【0007】

【課題を解決するための手段】本発明に係る浄水の一の製造装置は、原水タンク内に全量濾過式の精密濾過または限外濾過膜エレメントを浸漬設置し、該濾過膜エレメントの濾過液出口をポンプを介してクロスフロー方式の逆浸透膜モジュールの原液供給口に連通し、該逆浸透膜モジュールの濃縮原液出口を上記ポンプの入口側に連通したことを特徴とする構成である。本発明に係る浄水の他の製造装置は、原水タンク内に全量濾過式の精密濾過または限外濾過膜エレメントを浸漬設置し、逆浸透膜モジュールの濃縮原液出口にポンプを、該ポンプの出口にエゼクタをそれぞれ連通し、エゼクタの吸入口に前記濾過膜エレメントの濾過液出口を連通したことを特徴とする構成である。

【0008】

【発明の実施の形態】以下、図面を参照しつつ本発明の実施の形態について説明する。図1は本発明に係る浄水の一の製造装置の実施例を示す説明図である。図1において、1は原水タンク、11は原水供給配管である。2は原水タンク1内に浸漬設置した精密濾過または限外濾過膜エレメントであり、濾過液側の吸引・減圧で発生される膜間差圧によって全量濾過方式で操作される構成である。この精密濾過または限外濾過膜エレメントの膜には、平膜や中空糸膜を使用できる。例えば、図2の（イ）及び図2の（ロ）〔図2の（イ）におけるロー ロ断面図〕に示すように、両端にダクト811を有する枠

縁81に平膜82を融着または接着剤により貼着すると共に膜82，82間に濾過液流路保持材83（不織布、プラスチックネット等）を介在させ、ダクト811に濾過液取出し管812を取り付けた膜エレメント部材aを図3に示すように、ラック84に装着したものを使用できる。

【0009】図1において、3はクロスフロー方式で使用される逆浸透膜モジュールであり、この逆浸透膜モジュール3の原液供給口31に濾過膜エレメント2の濾過液出口810をポンプ4を介して連通してある。5は逆浸透膜モジュール3の濃縮液出口32をポンプ4の入口側に連通するリターン配管、6はリターン配管5中に設けた調圧弁である。7は逆浸透膜モジュール3の透過液出口33に連通した浄水タンクである。

【0010】本発明に係る浄水製造装置は、河川水、海水、地下水等を原水として浄水を得る場合に使用され、図1において、原水タンク1に原水が溜っている。浄水を製造するには、ポンプ4を駆動し、調圧弁6の絞り度を調節しつつ逆浸透膜モジュール3の原液室圧力を上昇させていく。この圧力上昇により逆浸透膜モジュール3での透過が行われると共に濾過膜エレメント2の濾過液側が減圧されて濾過膜エレメント2での濾過が行われ、定常状態に達すると、濾過膜エレメント2の濾過流束と逆浸透膜モジュール3の透過流束とがバランスし、逆浸透膜モジュール3の透過液出口33から浄水タンク7にほぼ一定流量で浄水が流入されていく。上記定常濾過流束または透過流束は、ポンプ4の回転速度や調圧弁6の絞り度により定まり、図5に示す従来例とは異なり、ポンプ間の連動といった厄介な操作は不要である。

【0011】図4は本発明に係る浄水の他の製造装置の実施例を示す説明図である。図4において、9はエゼクタであり、吸入口91に精密濾過または限外濾過膜エレメント2の濾過液出口810を連通し、逆浸透膜モジュール3の濃縮原液出口32をポンプ40の入口に連通し、ポンプ40の出口をエゼクタ9の入口92に連通し、エゼクタ9の出口93を逆浸透膜モジュール3の原液供給口31に連通してある。図4において、上記以外の構成は図1に示した実施例に実質的に同じであり、1は原水タンクを、11は原水供給配管を、7は浄水タンクをそれぞれ示している。

【0012】図4に示す浄水製造装置においては、エゼクタ9の吸引力で濾過膜エレメント2での濾過が行われ、エゼクタ9の出口圧力で逆浸透膜モジュール3での透過が行われる。この場合、エゼクタ9の吸引力はエゼクタ9内の流速で与えられ、この流速がポンプ40の出力とエゼクタ9の抵抗とで定まるし、また、エゼクタ出口93の圧力もポンプ40の出力とエゼクタ9の抵抗とで定まるから、濾過膜エレメント2の濾過流束及び逆浸透膜モジュール3の透過流束はポンプ40の出力とエゼクタ9の特性とで定まる定常値に到達し、逆浸透膜モジュール3の透過液出口33から浄水タンク7にほぼ一定流量で浄水が流入されるに至る。

【0013】

【発明の効果】本発明に係る浄水の製造装置においては、単一のポンプで運転されるから、複数基のポンプを使用する場合のポンプの連動を必要とせず、運転が簡単であり、またタンクも少ないので設置スペースを軽減できる。さらに、精密濾過または限外濾過膜エレメントの濾過液側と逆浸透膜モジュールとの間が密閉配管とされており、濾過膜エレメントで除菌されたのち逆浸透膜モジュールに至るまでの間での菌の繁殖を排除できるから、衛生的であり、逆浸透膜モジュールの膜のバクテリヤ分解の憂れも全くない。

【図面の簡単な説明】

【図1】本発明に係る浄水の製造装置の一例を示す説明図である。

【図2】本発明において使用する濾過膜エレメント部材の一例を示す説明図である。

【図3】本発明において使用する濾過膜エレメントの一例を示す説明図である。

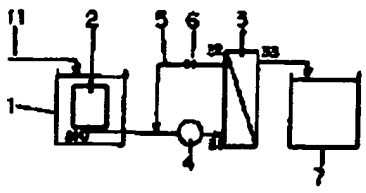
【図4】本発明に係る浄水の製造装置の一例を示す説明図である。

【図5】従来の浄水製造装置を示す説明図である。

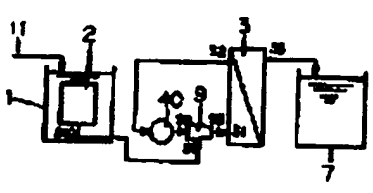
【符号の説明】

1	原水タンク
2	全量濾過式の精密濾過または限外濾過膜エレメント
3	逆浸透膜モジュール
4	ポンプ
40	ポンプ
7	浄水タンク
9	エゼクタ

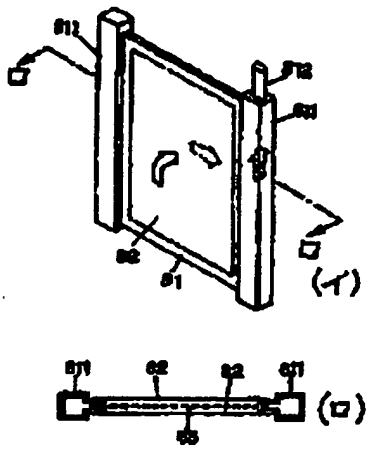
【図1】



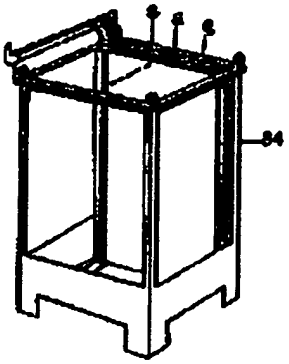
【図4】



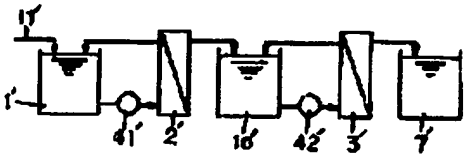
【図2】



【図3】



【図5】



CLAIMS

[Claim(s)]
[Claim 1] The manufacturing installation of the water purification which carries out immersion installation of precision filtration or the ultrafiltration membrane element of a whole-quantity filtration type into a raw water tank, and is characterized by having opened the filtrate outlet of this filtration membrane element for free passage through the pump to the undiluted solution feed hopper of the reverse osmosis membrane module of a cross-flow method, and opening the concentration undiluted solution outlet of this reverse osmosis membrane module for free passage to the entrance side of the above-mentioned pump.
[Claim 2] The manufacturing installation of the water purification which carries out immersion installation of precision filtration or the ultrafiltration membrane element of a whole-quantity filtration type into a raw water tank, and is characterized by having opened the pump for free passage to the concentration undiluted solution outlet of a reverse osmosis membrane module, having opened the ejector for free passage to the outlet of this pump, respectively, and opening the filtrate outlet of said filtration membrane element for free passage to inhalation opening of an ejector.

[Translation done.]

TECHNICAL FIELD

[Field of the Invention] This invention relates to the water purification manufacturing installation used when manufacturing water purification by using river water etc. as raw water.

[Translation done.]

PRIOR ART

[Description of the Prior Art] When obtaining water purification by using river water, a lake, an underground water, etc. as raw water, the coagulation sedimentation sand-filter method has been used traditionally, but in order to, aim at simplification of a maintenance, relief of a running cost, reduction of an installation tooth space, etc. these days, the membrane-separation method is thought as important. Although a micro filter, ultrafiltration membrane, a reverse osmotic membrane, etc. exist in the film used for a membrane-separation method, a micro filter and ultrafiltration membrane require the activity of a reverse osmosis membrane module, in order to also remove harmful matter, such as trihalomethane with difficult clearance, thoroughly.

[0003] The mainstream of this reverse osmosis membrane module is a spiral mold membrane module. In this spiral mold membrane module inside Transparency liquid flow channel maintenance material Around ****** the film envelope which dedicated for example, (a nonwoven fabric and a plastic net) Undiluted solution passage maintenance material The membrane element which opened opening of winding and this film envelope for free passage in ****** in the shape of a spiral with (for example, the plastic net) is contained in a tubed case. The undiluted solution feed hopper was established in the end of a tubed case, the concentration undiluted solution outlet was established in the other end of a drum case, respectively, raw water was circulated between the above-mentioned spiral winding layers, and transparency liquid is taken out from ******. If the gap of the undiluted solution passage between the above-mentioned spiral winding layers is made quite narrow and the raw water of a suspended matter is directly poured, in order to stop an outer diameter and to make a film surface product large in this spiral mold membrane module, since lock out of a raw water path will not be avoided, it is a sanitary-sewage characteristic about raw water. To pretreat or less to four is required, and it is well-known to use a precision filtration membrane module or an ultrafiltration membrane module for that pretreatment.

[0004] After pretreating by the precision filtration membrane module or the ultrafiltration membrane module, drawing 5 The well-known water purification line which carries out actual processing with a reverse osmosis membrane module is shown, and raw water is accumulated in raw-water-tank 1' by raw water charging line 11'. While carrying out application-of-pressure feeding of this raw water by pump 41' at pretreatment membrane module 2', filtering by the cross-flow method and returning concentration liquid to raw-water-tank 1', filtrate is once accumulated in primary-treatment water tank 10'. Furthermore, while carrying out application-of-pressure feeding of this primary-treatment water by pump 42' at reverse osmosis membrane module 3', carrying out transparency processing by the cross-flow method and returning concentration liquid to primary-treatment water tank 10', filtrate is accumulated in clarifying tank 7', and it is used as water purification.

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] In the manufacturing installation of water purification concerning this invention, since it is operated with a single pump, linkage of the pump in the case of using two or more sets of pumps is not needed, but since operation is easy and there are also few tanks, an installation tooth space is mitigable. Furthermore, between reverse osmosis membrane modules is considered as sealing piping the filtrate side of precision filtration or an ultrafiltration membrane element, since propagation of a bacillus until it results in a reverse osmosis membrane module can be eliminated after disinfecting with a filtration membrane element, it is sanitary and there is also no awe of bacteria disassembly of the film of a reverse osmosis membrane module.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, in the above-mentioned water purification manufacturing facility, although a biomass is removed by precision filtration membrane module or ultrafiltration membrane module 2' by the head end process, if bacteria tend to breed at the time of storage of water by primary-treatment water tank 10', it is insanitary, and there is also awe into which the film is disassembled by BARITERIYA depending on the class of film of reverse osmosis membrane module 3' and the chlorine for sterilization is poured in, the danger of film oxidation and degradation will arise. Furthermore, no less than three sets need a tank, vast-ization of an installation tooth space is not avoided, but a pump is also needed two sets, and the control unit for interlocking a rise and the whole of a running cost cannot escape complication, either. [0006] After pretreating suspended matter raw water, such as river water, by the micro filter or ultrafiltration membrane, the object of this invention is to offer the manufacturing installation of water purification which can guarantee positive abatement of degradation by simplification of the whole equipment structure, simplification of operation, chlorine, bacteria of a reverse osmosis membrane module, etc., when considering as water purification with a reverse osmosis membrane module.

[Translation done.]

MEANS

[Means for Solving the Problem] The manufacturing installation of 1 of water purification concerning this invention is a configuration which carries out immersion installation of precision filtration or the ultrafiltration membrane element of a whole-quantity filtration type into a raw water tank, and is characterized by having opened the filtrate outlet of this filtration membrane element for free passage through the pump to the undiluted solution feed hopper of the reverse osmosis membrane module of a cross-flow method, and opening the concentration undiluted solution outlet of this reverse osmosis membrane module for free passage to the entrance side of the above-mentioned pump. Other manufacturing installations of water purification concerning this invention are configurations characterized by having carried out immersion installation of precision filtration or the ultrafiltration membrane element of a whole-quantity filtration type into the raw water tank, having opened the pump for free passage to the concentration undiluted solution outlet of a reverse osmosis membrane module, having opened the ejector for free passage to the outlet of this pump, respectively, and opening the filtrate outlet of said filtration membrane element for free passage to inhalation opening of an ejector.
[0008]
[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained, referring to a drawing. Drawing 1 is the explanatory view showing the example of the manufacturing installation of 1 of water purification concerning this invention. In drawing 1 , 1 is a raw water tank and 11 is a raw water charging line. 2 is the precision filtration or the ultrafiltration membrane element which carried out immersion installation into the raw water tank 1, and is a configuration operated by the whole-quantity filtration method by the differential pressure between film generated in the attraction and reduced pressure by the side of filtrate. A flat film and a hollow fiber can be used for the film of this precision filtration or an ultrafiltration membrane element. For example, as shown in Law RO sectional view] in (b) of drawing 2 , and (b) of (b) [drawing 2 of drawing 2 while sticking a flat film 82 on the frame edge 81 which has a duct 811 to ends with welding or adhesives -- between the film 82 and 82 -- the filtration liquid flow channel maintenance material 83 (a nonwoven fabric --) A plastic net etc. is made to intervene and what equipped the rack 84 with the membrane element member a which attached the filtrate drawing tubing 812 in the duct 811 as shown in drawing 3 can be used.
[0009] In drawing 1 , 3 is a reverse osmosis membrane module used by the cross-flow method, and has opened the filtrate outlet 810 of the filtration membrane element 2 for free passage through the pump 4 to the undiluted solution feed hopper 31 of this reverse osmosis membrane module 3. Return piping for which 5 opens the concentration liquid outlet 32 of a reverse osmosis membrane module 3 for free passage to the entrance side of a pump 4, and 6 are the pressure regulating valves formed into the return piping 5. 7 is the clarifying tank which was open for free passage to the transparency liquid outlet 33 of a reverse osmosis membrane module 3.
[0010] It was used, when the water purification manufacturing installation concerning this invention used river water, a lake, an underground water, etc. as raw water and water purification was obtained, and the raw water tank 1 is covered with raw water in drawing 1 . In order to manufacture water purification, a pump 4 is driven, and the undiluted solution room pressure force of a reverse osmosis membrane module 3 is raised, adjusting whenever [drawing / of a pressure regulating valve 6]. If the filtrate side of the filtration membrane element 2 is decompressed, filtration with the filtration membrane element 2 is performed and a steady state is reached while transparency with a reverse osmosis membrane module 3 is performed by this pressure buildup, the filtration flux of the filtration membrane element 2 and the transparency flux of a reverse osmosis membrane

module 3 balance, and water purification flows into the clarifying tank 7 in the amount of about 1 steady flow from the transparency liquid outlet 33 of a reverse osmosis membrane module 3. the conventional example which the above-mentioned stationary filtration flux or transparency flux becomes settled by whenever [rotational-speed / of a pump 4 /, or drawing / of a pressure regulating valve 6], and is shown in drawing 5 -- differing -- the linkage between pumps -- when -- ** -- troublesome actuation is unnecessary.

[0011] Drawing 4 is the explanatory view showing the example of other manufacturing installations of water purification concerning this invention. In drawing 4 , 9 is an ejector, opens the filtrate outlet 810 of precision filtration or the ultrafiltration membrane element 2 for free passage to the inhalation opening 91, opens the concentration undiluted solution outlet 32 of a reverse osmosis membrane module 3 for free passage at the inlet port of a pump 40, opens the outlet of a pump 40 for free passage at the inlet port 92 of an ejector 9, and has opened the outlet 93 of an ejector 9 for free passage to the undiluted solution feed hopper 31 of a reverse osmosis membrane module 3. In drawing 4 , configurations other than the above are substantially the same as the example shown in drawing 1 , in 1, 11 shows a raw water charging line and 7 shows the clarifying tank for the raw water tank, respectively.

[0012] In the water purification manufacturing installation shown in drawing 4 , filtration with the filtration membrane element 2 is performed with the suction force of an ejector 9, and transparency with a reverse osmosis membrane module 3 is performed by the outlet pressure of an ejector 9. In this case, the suction force of an ejector 9 is given by the rate of flow in an ejector 9, and this rate of flow becomes settled in the output of a pump 40, and resistance of an ejector 9, and Moreover, since the pressure of the ejector outlet 93 also becomes settled in the output of a pump 40, and resistance of an ejector 9 Water purification comes [the filtration flux of the filtration membrane element 2 and the transparency flux of a reverse osmosis membrane module 3 reach the steady-state value which becomes settled in the output of a pump 40, and the property of an ejector 9, and / from the transparency liquid outlet 33 of a reverse osmosis membrane module 3 / to a clarifying tank 7] to flow in the amount of about 1 steady flow.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the explanatory view showing an example of the manufacturing installation of water purification concerning this invention.
[Drawing 2] It is the explanatory view showing an example of the filtration membrane element member used in this invention.
[Drawing 3] It is the explanatory view showing an example of the filtration membrane element used in this invention.
[Drawing 4] It is the explanatory view showing an example of the manufacturing installation of water purification concerning this invention.
[Drawing 5] It is the explanatory view showing the conventional water purification manufacturing installation.
[Description of Notations]
1 Raw Water Tank
2 Precision Filtration or Ultrafiltration Membrane Element of Whole-Quantity Filtration Type
3 Reverse Osmosis Membrane Module
4 Pump
40 Pump
7 Clarifying Tank
9 Ejector

[Translation done.]

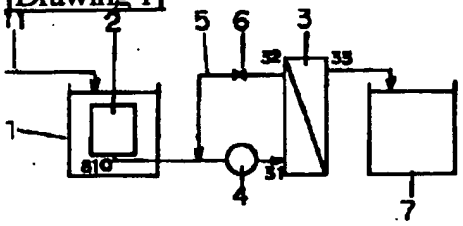
* NOTICES *

JPO and NCIPI are not responsible for any damages caused by the use of this translation.

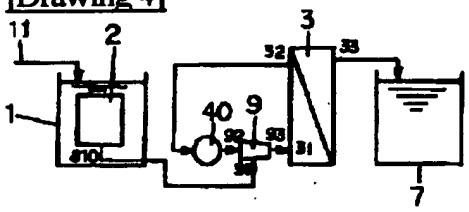
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

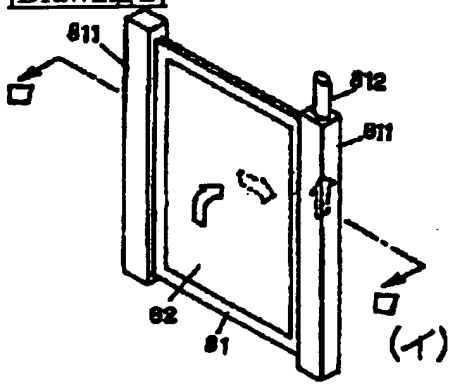
[Drawing 1]

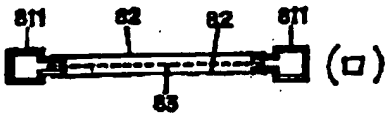


[Drawing 4]

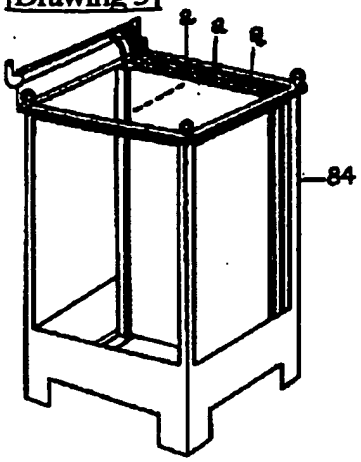


[Drawing 2]

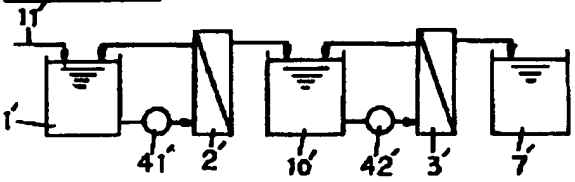




[Drawing 3]



[Drawing 5]



[Translation done.]